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www.INDnano.ir
www.nanoproduct.ir

I R A N • N A N O •
T E C H N O L O G Y
P R O D U C T S • •
A N D • • • • • • •
E Q U I P M E N T •

Home Appliances. Textile and Clothing






God willing, the country will see your progress and this direction of work toward market and wealth is very important. It means that this knowledge-based companies can literally use this program. This will make your scientific and research work more effective in people living environment. This is a guarantee of your work advances.

Part of statement by Supreme Leader of Islamic Revolution to the nanotechnology family, 31th January, 2014.



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The perspective of
IRAN NANO
products and market



In the twenty-year perspective of the country (2006-2026), Islamic republic of Iran has been considered a developed country, having the first place of economic, science and technology between the countries nearby, inspiring in Islamic world and having acceptable and effective interaction with the international community. Accordingly, the Iran Nanotechnology Innovation Council was established in 1382 to build coordination and create synergy between the executive headquarters of the country. The viewpoint of Iran Nanotechnology Innovation Council to develop(promote) nanotechnology was the development of a long-term activity framework of Iran in this field, so the first ten-year strategic program of nanotechnology was prepared and then passed by the government cabinet.

In the first ten-year, going forward to this perspective, some effective steps were taken and a pattern of scientific and targeted movements toward the development of nanotechnology was obtained.

In this document, attempts have been made to keep the goals and the way achieving them updated so that the country pioneering in this newfound technology continues better than before.

The document of the nanotechnology development has been compiled based on the evaluations of the first ten-year document implementation and its feedbacks and also based on new approaches and policies in the development of science and technology.

In the new era (nowadays), the main goals are increasing the country scientific authority, developing the nano industry and market and role-playing of this technology in the people's lives.

According to this view, nanotechnology advances in Islamic Iran would improve people's quality of life by having impact on the country developments and producing wealth until the year 1404. Due to this approach, a perspective (overview) and three main goals have been considered for the second ten-year nano advances in the country which are as follows:

Increasing the impact of nanotechnology on improving of people's quality of life.

Attainment of the country to an appropriate position in nanotechnology and science throughout the world.

Getting a proper share of the nanotechnology global market.

INTRODUCTION

Iran nanotechnology products book

Nanotechnology advances with the aim of producing wealth and improving people's quality of life have led to the production of various industrial products in different fields. For introducing industrial products which have nanoscale certificates, the eighth edition of books relating to nanotechnology products and equipment have been published in six volumes. In the present book (first volume), products related to buildings, paints and resins and home appliances are introduced.

Iran nanotechnology assessment unit

The assessment unit of Iran nanotechnology products was established with the support of Iran Nanotechnology Innovation Council in 1386 to increase customers' trust and improve nano products quality. The main mission of this unit is evaluating properties of a product, approving the product being nanoscale and granting a nanoscale certificate. Checking more than 2000 cases and giving certificates to more than 450 products is one of the achievements attributed to this unit over years.

The product assessment unit services

- Preliminary assessment (evaluation) of nanotechnology product technical documents
- Inspecting and granting nanoscale certificates
- Giving support for the product characterization and completion of technical documents
- Giving support to do operational tests and to get technical verifications
- Giving support to do quality control tests for nano B2B products
- Monitoring the market of nano products
- Creating a database of nano products and companies
- The supports of Iran Nanotechnology Innovation Council and the Corridor from companies having nanoscale certificates.

Nonotechnology product indicators

According to the international standard ISO/TS8004 and the national standard 21145 (Nanotechnology, words and terms and main definitions) nanotechnology product is a product which its applications and properties is based on nanotechnology or improved by nanotechnology.

Products having three conditions listed below are named nanotechnology products:

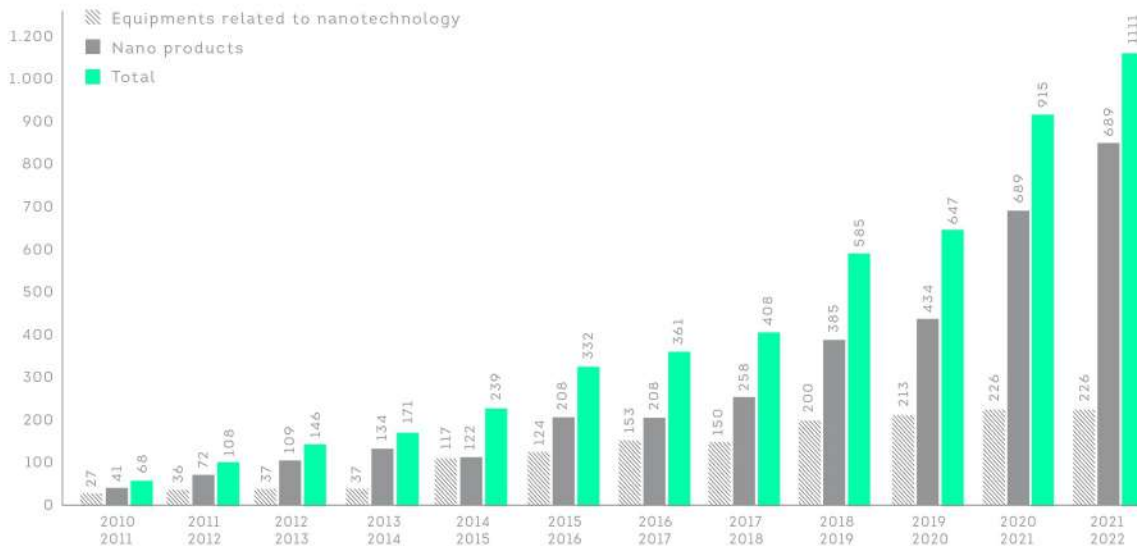
1. Nanotechnology or nanoscale scientific knowledge (1-100nm) is used in them.
2. The product applications and properties are improved by nanotechnology.
3. The product production process is based on engineering.

Products which are counted nanotechnology products according to standard ISO/TS8004 and the national standard 21145, are given nanoscale certificates after being assessed and examined with some related tests. Nanoscale certificates are issued with one-year validity which can be extended.

Moreover, during the validity of the certificate, periodic inspections are done to insure the product stability of scale and properties.

Nanoscale pilot(test) certificates are given to technologies and product which have just met some technical requirements but not the production and trade requirements existing in the institute bylaw such as product and utilization license, active quality control unit and other required licenses.

The number of nanotechnology products and equipments



Statistics related to nanotechnology products and equipments which took nanoscale certificates until 20 June 2020.

Total nano products and equipments

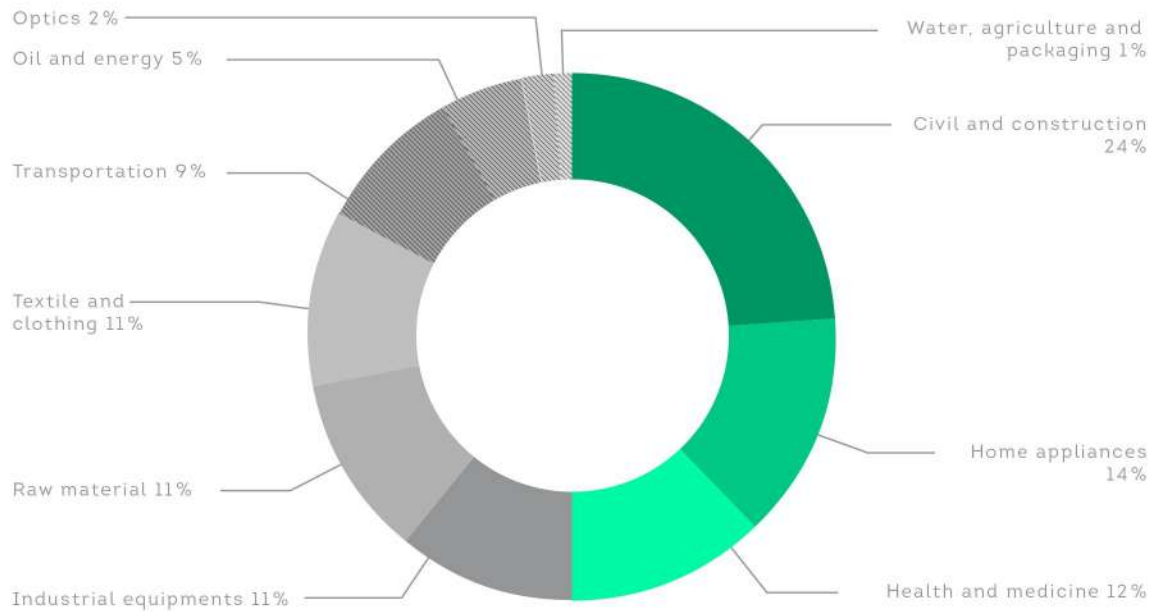


Manufacturing companies of nano products and equipments



Industrial domain of products having nanoscale certificates

Industrial domain of products having nanoscale certificates



The export target countries of Iran nano products in 2022

America

Canada

United States

Bolivia

Brazil

Cuba

Paraguay

Oceania

Australia

Europe

Austria

Bulgaria

Croatia

England

Estonia

Finland

Georgia

Germany

Greece

Italy

Kosovo

Lithuania

Europe

Netherlands

Poland

Portugal

Romania

Russia

Serbia

Spain

Sweden

Ukraine

Yugoslavia

Cyprus

Mongolia

Asia

Afghanistan

Armenia

Azerbaijan

Bangladesh

China

India

Iraq

Japan

Jordan

Kazakhstan

Kuwait

Kyrgyzstan

Asia

Lebanon

Malaysia

Oman

Pakistan

Qatar

South Korea

Syria

Tajikistan

Thailand

Turkey

Turkmenistan

United Arab Emirates

Asia

Uzbekistan

Singapore

Hong kong

Africa

Egypt

Kenya

South Africa

Tanzania

Mauritania

PRODUCTS

Home Appliances • • • •

Textile • • • • • • • •

Clothing • • • • • • •

HOME APPLIANCES

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SURFACE AND OBJECT HYDROPHOBIC COATINGS

FERMA High-tech Engineering Co. Ltd

www.alvanpaint.com

Toos Nano Powder Study

www.nanoproduct.ir

Nano Pad Sharif

www.nanopadsharif.com

Nano Faraz Sepahan

www.nanofaraz.com

Homan Shimi Pars

www.nanoproduct.ir

Description

This product is a nanoparticle-containing hydrophobic coating, which can be applied to the surface of various materials, e.g., wood, metal, ceramic, etc., to preserve their original appearance and eliminate the need for regular washing.

Nanotechnology-driven advantages

The deposition of nanoparticle-containing hydrophobic coating on various materials has led to:

- Enhanced corrosion resistance
- Saving water resources by eliminating the need for regular washing
- Prolonged lifetime of component
- Economic efficiency

Applications

- Car bodies
- Building facades





DISHWASHER AND WASHING MACHINE WITH ANTI-CORROSION BODY

Description

This product is a nano-thick conversion coating, which is deposited on the body of dishwashers and washing machines to protect them against the corrosive media.

Nanotechnology-driven advantages

The application of a nano-thick coating on the interior walls of washing machines results in:

- Improved corrosion resistance
- Enhanced adhesion to the underlying surfaces

The obtained results of the scratch and salt spray tests are reported below:

Scratch test (according to ASTM D1654-16) and salt spray test (according to ASTM B117-16)	Corrosion resistance and Peeling
Acceptable standard level	10
Control sample	5,6
Nano sample	10,10

Applications

- Domestic appliances, such as washing machines and dishwashers



1	Auto	15	Normal	15	Half Load
2	Auto	15	Normal	15	Normal
3	Auto	15	Normal	15	Normal
4	Auto	15	Normal	15	Normal
5	Auto	15	Normal	15	Normal
6	Auto	15	Normal	15	Normal
7	Auto	15	Normal	15	Normal
8	Auto	15	Normal	15	Normal
9	Auto	15	Normal	15	Normal
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28	Auto	15	Normal	15	Normal
29	Auto	15	Normal	15	Normal
30	Auto	15	Normal	15	Normal

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15:00
2 3 4 5 6

ANTIBACTERIAL MINI WASHER

Belson Razan Tejarat

www.belson.ir

Description

This product is a nanoparticle-filled plastic which can be deposited on the inner surfaces of mini washers and make them anti-bacterial.

Nanotechnology-driven advantages

The exploitation of nanoparticles in fabricating this polymeric product has resulted in:

- Better antibacterial activity

The experimental results of antibacterial assays against different bacteria are reported below:

Specimens	Antibacterial activity (according to INSO 10900)
Acceptance standard limit	2
Control sample	0
Nano sample (S. aureus)	2.11
Nano sample (E. coli)	2.18

Applications

- Small washing machines



STOVE WITH OLEOPHOBIC COVER

Arkan Sakhtar Novin Iranian

www.snowa.ir

Description

This product is an oleophobic coating filled by nanoparticles, which can be applied on glass parts of gas stoves to facilitate their cleaning process.

Nanotechnology-driven advantages

The utilization of nanoparticles in the coating has led to:

- Facile removal of contaminants

The obtained results of the contact angle tests for the control sample and nano sample are reported in the following table:

Specimens	Static contact angle (N-hexane)/ according to INSO 20030	Static contact angle (Oleic Acid)/ according to INSO 20030
Control sample	0	0
Nano sample	37	77

Applications

- Gas stoves



ANTIBACTERIAL REFRIGERATOR AND FREEZER

Electro Steel

www.es.co.ir

Description

This product is a refrigerator in which the interior wall of the door contains specific nanoparticles with antibacterial property.

The utilization of oxide nanoparticles in this application field results in:

- Superior antibacterial activity

The measured results of antibacterial assays against different bacteria are reported below:

Specimens	Antibacterial activity (according to ISIRI 10900)
Acceptable standard level	2 (equivalent to 99%)
Control sample	0
Nano sample (E. coli)	2.95
Nano sample (S. aureus)	3.01

Applications

- Interior surfaces in refrigerators and freezers



UTENSILS WITH GOLDEN NANOSTRUCTURED COATING

Tak Steel Paya

www.taksteel.com

Description

This product is a serving dish coated by a nanostructured layer using the PVD technique. The coated metallic dish benefits from a golden appearance with a long-term color stability.

Nanotechnology-driven advantages

The deposition of the aforementioned nanostructured layer on metallic surfaces may lead to:

- Enhanced corrosion resistance
- Improved abrasion and wear resistance
- Better appearance
- Superior scratch resistance

Applications

- Serving dishes



ANTIBACTERIAL FOOD STORAGE CONTAINERS

Sanat Sazan Ideal Plast

www.maniaco.com.au

Description

This product is a food storage container, composed of a polymeric masterbatch and certain nanoparticles as an antibacterial reinforcing agent.

Nanotechnology-driven advantages

The exploitation of antibacterial polymer in this product during the fabrication process has yielded:

- Superior antibacterial activity

The measured results related to the antibacterial test of the nano sample is reported below:

Specimens	Antibacterial activity
Acceptance criteria	2 (equivalent to 99%)
Nano sample (S. Aureus)	2.3
Nano sample (E. Coli)	2.14

Applications

- Food storage containers





ANTIBACTERIAL AIR FILTERS FOR EVAPORATIVE COOLERS

Raymand Intelligent Machine

www.raymandmh.com

Description

This product is an air filter containing metallic nanoparticles, and is used in evaporative coolers to deteriorate a wide variety of bacterial species or stop their growth in humid media.

Nanotechnology-driven advantages

The addition of metallic nanoparticles to the main starting material during the fabrication process of air filters has led to:

- Enhanced antibacterial activity

The practical results of antibacterial assay for the control sample and nano sample are reported below:

Sample type (INSO 11070)	Antibacterial activity
Acceptable Standard Level	2
Control Sample	0
Nano Sample (E. coli)	2.97
Nano Sample (S. aureus)	3.33

Applications

- Evaporative coolers



ANTIBACTERIAL MOP

Textile Cleaning Industry Azar Mop Parmis and Farhad

www.azarpak.ir

Description

This product is a mop comprised of nanoparticles-modified microfibers. It possesses strong fibers with high cleaning efficiency.

Nanotechnology-driven advantages

The development of nanoparticles inside the microfibers of the mop leads to:

- Improved antibacterial activity with high stability
- Better water adsorption capability

The results of antibacterial assay are listed below:

Specimens (INSO 11070)	Antibacterial activity
Acceptable standard limit	2 (equivalent to 99%)
Nano sample (<i>S. aureus</i>)	2.45
Nano sample (<i>E. coli</i>)	2.36

Applications

- Home and kitchen cleaning
- Hospital cleaning
- Food factories



ANTIBACTERIAL CABINET TRASH

Sanat Sazan Ideal Plast

www.maniaco.com.au

Description

This product is a lightweight and highly moisture-resistant trash can cabinet, in which the polymer body is modified by nanoparticles as an antibacterial agent.

Nanotechnology-driven advantages

The addition of nanoparticles into the polymer body has yielded:

- Improved antibacterial activity
- High efficiency in preventing the growth of bacteria and fungi

The results of antibacterial assay are reported as follows:

Sample type (ISIRI 10900)	Antibacterial activity
standard Acceptable limit	2 (equivalent to 99%)
Nano sample (<i>S. aureus</i>)	2.15
Nano sample (<i>E. coli</i>)	1.75

Applications

Trash can cabinets used in

- Offices
- Residential buildings (baby rooms, bathrooms, kitchens, etc.)



ANTIBACTERIAL HERBAL TONIC

Kimya Pajoohesh Mahan

www.kmpo.ir

Description

This product is a metal nanoparticle-containing herbal tonic, which can efficiently protect and clean the leather surfaces without degrading their polymer chain.

Nanotechnology-driven advantages

The inclusion of metal nanoparticles in the tonic has resulted in:

- Enhanced antibacterial and antifungal activities

Applications

- Cleaning and protection of leather surfaces including bags, shoes, clothes, furniture, etc.



TEXTILE AND CLOTHING

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H E A L T H Y F I B E R

Tehran Zar Nakh

www.zarnakh.com

Description

This product is a ceramic nanoparticle-containing textile, which is able to restore the absorbed infrared light by the human body, leading to favorable biological effects such as enhanced blood circulation and metabolism.

Nanotechnology-driven advantages

The incorporation of ceramic nanoparticles to the fibers has led to:

- Generation of far-infrared waves and consequently, increase in energy level and metabolism of the body, better blood circulation, and tension reduction

The results of the thermography test performed to measure the temperature of the control sample and nano sample are reported below:

Specimens	Thermography results in °C (According to ISSN 1424-8220)
Acceptable standard level	---
Control sample	0.3
Nano sample	1.7

Applications

- Healthcare products such as compression stockings, medical belts, socks, and sportswear



ANTIBACTERIAL POLYAMIDE YARN

Tehran Zar Nakh

www.zarnakh.com

Description

This product is an oxide nanoparticles-modified polyamide yarn resisting human pathogenic bacteria. It can be used in a variety of industrial and clinical applications.

Nanotechnology-driven advantages

The addition of metal oxide nanoparticles to the polymeric yarn has resulted in:

- Emergence of the antibacterial activity

The measured results for the antibacterial activity test are provided below:

Specimens	Antibacterial activity (according to INSO 11070)
Standard acceptable level	2
Control sample	0
Nano sample (E. coli)	2
Nano sample (S. aureus)	2.1

Applications

- Clothing of healthcare personnel
- Home clothes, including socks, mattresses, baby diapers, and coverings
- Medical devices
- Sportswear
- Food packaging
- Storage
- Thermal and mechanical protection
- Automotive textiles
- Heating, ventilation and air conditioning
- Air filters
- Water purification systems



ANTIBACTERIAL NANOPARTICLE CONTAINING POLYESTER FIBER

Liapood

www.liapood.com

Description

This product is an antibacterial polyester fiber in which metal and metal oxide nanoparticles are embedded to make the fabricated socks and other clothes antibacterial and longer-lasting.

Nanotechnology-driven advantages

The addition of the nanoparticles to the polyester fibers has given rise to:

- The emergence of antibacterial property
- More durable clothing fabricated thereof

The measured results for the antibacterial activity test of the nanoparticle-containing polyester fibers are reported as follows:

Specimens	Antibacterial activity (According to INSO 11070)
Acceptable standard limit	2
Nano sample (against S. Aureus)	2.63
Nano sample (against E. Coli)	2.31

Applications

- Clothing industry





ANTIBACTERIAL POLYESTER FIBER

Kian Behris Mahyar

www.kianbehris.com

Description

This product is an antibacterial polyester fiber in which metal and metal oxide nanoparticles are embedded to make the fabricated socks and other clothes antibacterial and longer-lasting.

Nanotechnology-driven advantages

The addition of the nanoparticles to the polyester fibers has given rise to:

- The emergence of antibacterial property
- More durable clothing fabricated thereof

The antibacterial activity of the nanoparticle-containing polyester fibers are reported below:

Specimens	Antibacterial activity (According to INSO 11070)
Acceptable standard limit	2
Nano sample (S. Aureus)	2.69
Nano sample (E. Coli)	2.52

Applications

- Textile industry



ANTIBACTERIAL FEVER-MONITORING BABY CLOTHES

Casper

www.caspersocks.ir

Description

This product is an antibacterial smart cloth for the infants, enabling the real-time detection of the baby's fever in the early minutes through changing its color from blue or pink to white. It is composed of anti-allergic fibers with a high temperature sensitivity.

Nanotechnology-driven advantages

Applying the nanoparticles and thermochromic pigments to the tissue fibers has resulted in:

- Emergence of antifungal and antibacterial properties
- Ability to real-time monitor the temperature of infants' body

The antibacterial activity test results of the nano sample are reported below:

Control sample	Antibacterial Activity (According to INSO 11070)
Acceptable standard limit	2 (equivalent to 99%)
Nano sample (S.Aureus)	2.27
Nano sample (E.Coli)	2.34

Applications

- Real-time monitoring the fever of baby's body



ANTIBACTERIAL COTTON FABRICS FOR BABY CLOTHES

Taravat Ofogh Zendegi

www.nanoproduct.ir

Description

This product is an antibacterial cotton fabric by which a broad spectrum of the baby clothes and beds can be produced. This textile benefits from a soft and light tissue, does not cause allergenic reactions for the babies, and becomes easy to wash.

Nanotechnology-driven advantages

The exploitation of nanoparticles in the internal structure of the cotton fabrics has resulted in:

- Emergence of antibacterial activity in environmental conditions
- Preventing the growth of bacteria and fungi

The measured results for the antibacterial activity test of the nano sample are reported below:

Specimens	Antibacterial Activity (According to INSO 11070)
Standard acceptable limit	2 (equivalent to 99%)
Nano sample (S.Aureus)	2.86
Nano sample (E.Coli)	2.54

Applications

- Antibacterial hug care clothes
- Antibacterial hug care clothes
- Antibacterial feeding pillows
- Antibacterial baby clothes
- Antibacterial breastfeeding clothing



NANOPARTICLE INCLUDING ANTIBACTERIAL SOCKS

Isazadeh production workshop

www.nanoproduct.ir

Michka Aria poosh

www.michkaco.com

Khatibi monfared

www.moorcheh-socks.com

Pooshak mahyar

www.mahyarco.com

Caspian joorab

www.caspersocks.com

Paara socks production

www.paara-socks.com

Tolidi Nanopa

www.nanoproduct.ir

Pishran Nasaji Ayandeh(Highno)

www.highnoshop.com

Jorabafi Papoosh

www.nanoproduct.ir

Description

This product is an antibacterial sock composed of conventional fabrics and embedded oxide or metal nanoparticles. It is able to efficiently prevent the unpleasant odor arisen from the foot transpiration and can be appropriate for the athletes and workers with sensitive foot skin.

Nanotechnology-driven advantages

The inclusion of metal and oxide nanoparticles in the texture of the fibers has led to:

- Emergence of antibacterial properties
- Preventing the growth of bacteria and fungi

Applications

- Antibacterial socks



NANOPARTICLE INCLUDING ANTIBACTERIAL TOWEL

Yas Sepid Mashhad
Caspian Jorab

www.nanoproduct.ir
www.caspersocks.com

Description

This product is an antibacterial towel which can effectively prevent the growth of bacteria, but no dermal allergies and environmental challenges arise from.

Nanotechnology-driven advantages

The utilization of nanoparticles in the internal structure of tower-forming fibers has resulted in:

- Emergence of antibacterial properties
- Preventing the growth of bacteria and fungi
- Making the tower anti-allergic

The measured results for the antibacterial activity test of the nano sample are reported below:

Specimens	Antibacterial activity (according to INSO 10900)
Standard acceptable limit	2 (equivalent to 99%)
Nano sample (S.Aureus)	2.69
Nano sample (E.Coli)	2.09

Applications

- Antibacterial Towel



ANTIBACTERIAL CARPET

Pamchal Textile Industries Company

www.carpetnano.com

Nasaji Farokh Sepehr Kashan

www.farrahicarpet.com

Yadegar Kohan Jey Carpet

www.nanoproduct.ir

Description

This product is an antibacterial carpet whose fibers are modified by oxide nanoparticles after weaving to avoid the growth, propagation, and accumulation of infected bacteria. It is often packaged in polymeric films.

Nanotechnology-driven advantages

The utilization of oxide nanoparticles in the internal structure of carpet-forming fibers has resulted in:

- Emergence of strong antibacterial properties
- Preventing the growth of bacteria and fungi

Applications

- Short commute places such as schools
- Public places such as mosques
- Kids' rooms
- The rooms of patients and people with cutaneous, ocular, and respiratory allergies



ANTIBACTERIAL AIRCRAFT BLANKET FABRIC

Zarba Amin Textile Industries Co.

www.zarbaamin.com

Description

This product is an antibacterial aircraft blanket made of polyester and acrylic fabrics containing nanoparticles to kill bacteria and microbes.

Nanotechnology-driven advantages

The incorporation of nanoparticles into the fabric is responsible for:

- Emergence of antibacterial properties

The antibacterial activity results of the nanoparticles-containing fabric are reported below:

Specimens (According to INSO 11070)	Antibacterial activity after washing for 10 times	Antibacterial activity before washing
Acceptable standard limit	2	2
Control sample	0	0
Nano sample (S. Aureus)	2.63	2.81
Nano sample (E. Coli)	2.25	2.51

Applications

- Antibacterial blanket for airplanes



NANOPARTICLE CONTAINING ANTIBACTERIAL MOQUETTE

Zarif Mosavar

www.zarifmosavar

Description

This product is an antibacterial moquette whose fibers are modified by oxide nanoparticles with high capability to disinfect the bacteria, inhibit their growth, and suppress the unpleasant odors. It is rinse-resistant to conventional disinfectants and maintains its color stability.

Nanotechnology-driven advantages

The utilization of oxide nanoparticles in the internal structure of moquette-forming fibers has resulted in:

- Emergence of strong antibacterial properties
- Preventing the growth of bacteria and fungi
- Suppressing the unpleasant odors

The measured results for the antibacterial activity test of the nano sample are summarized below:

Specimens	Antibacterial Activity (According to ISIRI 10900)
Standard acceptable limit	2 (equivalent to 99%)
Nano sample (S.Aureus)	2.51
Nano sample (E.Coli)	2.39

Applications

Antibacterial soft floor coverings or moquettes for:

- Kitchen
- Child Room
- The office
- Kindergarten
- Public places such as mosques and schools

